WHAT IS CLAIMED IS:

1. A solid-state image pickup apparatus for separating incident light into colors at positions corresponding to apertures formed in a screening member, which screens the incident light, converting resulting color-separated light to electric signals, and processing said electric signals to thereby output broadband signals, said apparatus comprising:

an image pickup section comprising:

a color filter comprising color filter segments for separating light incident via the apertures into a plurality of colors each having a particular spectral characteristic, wherein said color filter segments include color filter segments having complementary color spectral characteristics;

an image sensing section comprising photosensitive cells for converting the light transmitted through said color filter segments to electric signals, wherein nearby ones of said photosensitive cells are shifted from each other in at least one of a vertical and a horizontal direction in a bidimensional arrangement;

electrodes arranged in such a manner as to skirt round the apertures for producing signals from said photosensitive cells; and

transfer registers each for sequentially transferring the signals input via said electrodes in a vertical direction or a horizontal direction;

an operation commanding circuit for outputting a timing and any one of a plurality of modes for reading the signals out of said image pickup section;

a digitizing circuit for converting the signals read out of said image pickup section to digital data, wherein said digital data are arranged in a plane that contains said photosensitive cells and virtual pixels derived from a shifted arrangement of said photosensitive cells; and

a signal processing circuit for interpolating, in a first

mode designated by said operation commanding circuit, pixel data in positions of said virtual pixels or positions of said photosensitive cells and generating three primary color data on the basis of a plurality of pixel data, which are produced by mixing pixel data, or interpolating, in a second mode designated by said operation commanding circuit, three primary color image data in the positions of said virtual pixels on the basis of all pixel data sequentially read out of said photosensitive cells, generating three primary color pixel data at the positions of said photosensitive cells on the basis of said pixel data given to said virtual pixels, and broadening a frequency band of said thee primary color image data.

2. The apparatus in accordance with claim 1, wherein assuming that a distance between nearby ones of said photosensitive cells each corresponding to one of the apertures is represented by a pixel pitch, said apertures have a tetragonal or a polygonal shape and are arranged bidimensionally by being shifted from each other by one-half of the pixel pitch in the vertical direction column by column or in the horizontal direction row by row or have a 45°-rotated tetragonal or a polygonal shape and are arranged bidimensionally.

3. The apparatus in accordance with claim 2, wherein said color filter segments use a plurality of colors selected from cyan (Cy), magenta (Mg), yellow (Ye), white (W) and green (G) derived from subtractive mixture, wherein a first color is arranged in a tetragonal lattice pattern with the nearby photosensitive cells being shifted from each other by one-half of the pixel pitch, and wherein a second and a third color are arranged in either one of a checker pattern and a full-checker pattern while being shifted from said tetragonal lattice pattern by one-half of the pixel pitch.

4. The apparatus in accordance with claim 2, wherein said color filter segments use a plurality of colors selected from Cy, Mg, Ye, W and G derived from subtractive mixture, wherein a first color is arranged in a tetragonal lattice pattern with the nearby photosensitive cells being shifted from each other by one-half of the pixel pitch, and wherein a second and a third color are arranged in stripe patterns alternating with each other in the horizontal direction, while being shifted from said tetragonal lattice pattern by one-half of the pixel pitch.

5. The apparatus in accordance with claim 1, wherein said color filter segments use a plurality of colors selected from Cy, Mg, Ye, W and G derived from subtractive mixture, wherein a first tetragonal lattice implemented by four of said colors contains first color positioned at one pair of diagonally opposite corners, a second and a third color respectively positioned at the other pair of diagonally opposite corners, and a fourth color positioned at a center, and wherein a second tetragonal lattice, which is shifted from said first tetragonal lattice by one-half of the pixel pitch in the horizontal and vertical directions, contains said second and third colors at one pair of diagonally opposite corners and said fourth color at the other pair of diagonally opposite corners in a full-checker pattern.

6. The apparatus in accordance with claim 2, wherein said color filter segments use a plurality of colors selected from Cy, Mg, Ye, W and G derived from subtractive mixture, wherein a first tetragonal lattice implemented by four of said colors contains a first color positioned at one pair of diagonally opposite corners, a second color positioned at the other pair of diagonally opposite corners, and a third color positioned at a center, wherein a second tetragonal lattice, which is

shifted from said first tetragonal lattice by one-half of the pixel pitch in the horizontal and vertical directions, contains a same color positioned at one pair of diagonally opposite corners and a same color positioned at the other pair of diagonally opposite corners in a checker pattern, and wherein said first and second tetragonal lattices partly overlap each other.

7. The apparatus in accordance with claim 2, wherein said color filter segments use a plurality of colors selected from Cy, Mg, Ye, W and G derived from subtractive mixture, wherein a first tetragonal lattice implemented by four of said colors contains a first color positioned at one pair of diagonally opposite corners, a second and a third color respectively positioned at the other pair of diagonally opposite corners, and a fourth color positioned at a center, wherein a second tetragonal lattice, which is shifted from said first tetragonal lattice by one-half of the pixel pitch in the horizontal and vertical directions, contains a same color positioned at one pair of diagonally opposite corners, and a color different from three colors positioned at vertexes of a triangle, which is formed in a shifted direction of said first tetragonal lattice, in a full-checker pattern, and wherein said first and second tetragonal lattices overlap each other.

8. The apparatus in accordance with claim 3, wherein said image pickup section performs, in the fist mode, interlace scanning to thereby read out signal charges of a same filed while mixing pixels or sequentially reads out, in the second mode, all signal pixels.

9. The apparatus in accordance with claim 4, wherein said image pickup section performs, in the fist mode, interlace scanning to thereby read out signal charges of a same filed

while mixing pixels or sequentially reads out, in the second mode, all signal pixels.

10. The apparatus in accordance with claim 5, wherein said image pickup section performs, in the fist mode, interlace scanning to thereby read out signal charges of a same filed while mixing pixels or sequentially reads out, in the second mode, all signal pixels.

11. The apparatus in accordance with claim 6, wherein said image pickup section performs, in the fist mode, interlace scanning to thereby read out signal charges of a same filed while mixing pixels or sequentially reads out, in the second mode, all signal pixels.

12. The apparatus in accordance with claim 7, wherein said image pickup section performs, in the fist mode, interlace scanning to thereby read out signal charges of a same filed while mixing pixels or sequentially reads out, in the second mode, all signal charges.

13. The apparatus in accordance with claim 8, wherein said signal processing circuit comprises:

a correcting circuit for correcting pixel data fed from said photosensitive cells;

an interpolating circuit for generating, in the first mode, primary color pixel data at the positions of said virtual pixels or the positions of said photosensitive cells or calculating, in the second mode, primary color pixel data at the positions of said virtual pixels, calculating the primary color data at the positions of said photosensitive cells by using calculated primary color pixel data, generating luminance data at the positions of said virtual pixels, and calculating luminance data at the positions of said photosensitive cells

by using calculated luminance data;

a high frequency circuit for raising a frequency band of the pixel data output from said interpolating circuit to a higher frequency band;

a matrix circuit for generating luminance data and chrominance data by using pixel data output from said high frequency circuit;

a first filter circuit for removing aliasing distortion from the luminance data and the chrominance data; and

a chroma adjusting circuit for executing gain adjustment with each of the luminance data and the chrominance data.

14. The apparatus in accordance with claim 9, wherein said signal processing circuit comprises:

a correcting circuit for correcting pixel data fed from said photosensitive cells;

an interpolating circuit for generating, in the first mode, primary color pixel data at the positions of said virtual pixels or the positions of said photosensitive cells or calculating, in the second mode, primary color pixel data at the positions of said virtual pixels, calculating the primary color data at the positions of said photosensitive cells by using calculated primary color pixel data, generating luminance data at the positions of said virtual pixels, and calculating luminance data at the positions of said photosensitive cells by using calculated luminance data;

a high frequency circuit for raising a frequency band of the pixel data output from said interpolating circuit to a higher frequency band;

a matrix circuit for generating luminance data and chrominance data by using pixel data output from said high frequency circuit;

a first filter circuit for removing aliasing distortion from the luminance data and the chrominance data; and

a chroma adjusting circuit for executing gain adjustment with each of the luminance data and the chrominance data.

15. The apparatus in accordance with claim 10, wherein said signal processing circuit comprises:

a correcting circuit for correcting pixel data fed from said photosensitive cells;

an interpolating circuit for generating, in the first mode, primary color pixel data at the positions of said virtual pixels or the positions of said photosensitive cells or calculating, in the second mode, primary color pixel data at the positions of said virtual pixels, calculating the primary color data at the positions of said photosensitive cells by using calculated primary color pixel data, generating luminance data at the positions of said virtual pixels, and calculating luminance data at the positions of said photosensitive cells by using calculated luminance data;

a high frequency circuit for raising a frequency band of the pixel data output from said interpolating circuit to a higher frequency band;

a matrix circuit for generating luminance data and chrominance data by using pixel data output from said high frequency circuit;

a first filter circuit for removing aliasing distortion from the luminance data and the chrominance data; and

a chroma adjusting circuit for executing gain adjustment with each of the luminance data and the chrominance data.

16. The apparatus in accordance with claim 11, wherein said signal processing circuit comprises:

a correcting circuit for correcting pixel data fed from said photosensitive cells;

an interpolating circuit for generating, in the first mode, primary color pixel data at the positions of said virtual

pixels or the positions of said photosensitive cells or calculating, in the second mode, primary color pixel data at the positions of said virtual pixels, calculating the primary color data at the positions of said photosensitive cells by using calculated primary color pixel data, generating luminance data at the positions of said virtual pixels, and calculating luminance data at the positions of said photosensitive cells by using calculated luminance data;

a high frequency circuit for raising a frequency band of the pixel data output from said interpolating circuit to a higher frequency band;

a matrix circuit for generating luminance data and chrominance data by using pixel data output from said high frequency circuit;

a first filter circuit for removing aliasing distortion from the luminance data and the chrominance data; and

a chroma adjusting circuit for executing gain adjustment with each of the luminance data and the chrominance data.

17. The apparatus in accordance with claim 12, wherein said signal processing circuit comprises:

a correcting circuit for correcting pixel data fed from said photosensitive cells;

an interpolating circuit for generating, in the first mode, primary color pixel data at the positions of said virtual pixels or the positions of said photosensitive cells or calculating, in the second mode, primary color pixel data at the positions of said virtual pixels, calculating the primary color data at the positions of said photosensitive cells by using calculated primary color pixel data, generating luminance data at the positions of said virtual pixels, and calculating luminance data at the positions of said photosensitive cells by using calculated luminance data;

a high frequency circuit for raising a frequency band

of the pixel data output from said interpolating circuit to a higher frequency band;

a matrix circuit for generating luminance data and chrominance data by using pixel data output from said high frequency circuit;

a first filter circuit for removing aliasing distortion from the luminance data and the chrominance data; and

a chroma adjusting circuit for executing gain adjustment with each of the luminance data and the chrominance data.

18. The apparatus in accordance with claim 13, wherein said interpolating circuit comprises:

a primary color generating circuit for generating, in the first mode, primary color pixel data at the position of said virtual pixels or said photosensitive cells on the basis of pixel data of colors, which include the complementary colors, surrounding said virtual pixels or said photosensitive cells; and

a still picture data calculating circuit for generating, in the second mode, primary color pixel data at the positions of said virtual pixels on the basis of actual pixel data of colors including the complementary colors, calculating the primary color data at the positions of said photosensitive cells by using calculated pixel data, generating luminance data at the positions of said virtual pixels, and calculating luminance data at the positions of said photosensitive cells by using calculated luminance data.

19. The apparatus in accordance with claim 14, wherein said interpolating circuit comprises:

a primary color generating circuit for generating, in the first mode, primary color pixel data at the position of said virtual pixels or said photosensitive cells on the basis of pixel data of colors, which include the complementary colors,

surrounding said virtual pixels or said photosensitive cells; and

a still picture data calculating circuit for generating, in the second mode, primary color pixel data at the positions of said virtual pixels on the basis of actual pixel data of colors including the complementary colors, calculating the primary color data at the positions of said photosensitive cells by using calculated pixel data, generating luminance data at the positions of said virtual pixels, and calculating luminance data at the positions of said photosensitive cells by using calculated luminance data.

20. The apparatus in accordance with claim 15, wherein said interpolating circuit comprises:

a primary color generating circuit for generating, in the first mode, primary color pixel data at the position of said virtual pixels or said photosensitive cells on the basis of pixel data of colors, which include the complementary colors, surrounding said virtual pixels or said photosensitive cells; and

a still picture data calculating circuit for generating, in the second mode, primary color pixel data at the positions of said virtual pixels on the basis of actual pixel data of colors including the complementary colors, calculating the primary color data at the positions of said photosensitive cells by using calculated pixel data, generating luminance data at the positions of said virtual pixels, and calculating luminance data at the positions of said photosensitive cells by using calculated luminance data.

21. The apparatus in accordance with claim 16, wherein said interpolating circuit comprises:

a primary color generating circuit for generating, in the first mode, primary color pixel data at the position of

said virtual pixels or said photosensitive cells on the basis of pixel data of colors, which include the complementary colors, surrounding said virtual pixels or said photosensitive cells; and

a still picture data calculating circuit for generating, in the second mode, primary color pixel data at the positions of said virtual pixels on the basis of actual pixel data of colors including the complementary colors, calculating the primary color data at the positions of said photosensitive cells by using calculated pixel data, generating luminance data at the positions of said virtual pixels, and calculating luminance data at the positions of said photosensitive cells by using calculated luminance data.

22. The apparatus in accordance with claim 17, wherein said interpolating circuit comprises:

a primary color generating circuit for generating, in the first mode, primary color pixel data at the position of said virtual pixels or said photosensitive cells on the basis of pixel data of colors, which include the complementary colors, surrounding said virtual pixels or said photosensitive cells; and

a still picture data calculating circuit for generating, in the second mode, primary color pixel data at the positions of said virtual pixels on the basis of actual pixel data of colors including the complementary colors, calculating the primary color data at the positions of said photosensitive cells by using calculated pixel data, generating luminance data at the positions of said virtual pixels, and calculating luminance data at the positions of said photosensitive cells by using calculated luminance data.

23. The apparatus in accordance with claim 18, wherein said still picture data calculating circuit comprises:

a primary color generating circuit for simultaneously generating three primary color pixel data at the position of each virtual pixel;

a primary color generating and interpolating circuit for calculating and interpolating, by using the three primary color pixel data, the primary color data at the position of each photosensitive cell surrounded by said three primary color pixel data, and outputting plane pixel data color by color;

a luminance data generating circuit for generating luminance data at the position of said virtual pixel on the basis of the surrounding pixel data of colors, which include complementary colors; and

a luminance generating and interpolating circuit for interpolating luminance data at the position of said photosensitive cell surrounded by the luminance data, and outputting plane luminance data.

24. The apparatus in accordance with claim 19, wherein said still picture data calculating circuit comprises:

a primary color generating circuit for simultaneously generating three primary color pixel data at the position of each virtual pixel;

a primary color generating and interpolating circuit for calculating and interpolating, by using the three primary color pixel data, the primary color data at the position of each photosensitive cell surrounded by said three primary color pixel data, and outputting plane pixel data color by color;

a luminance data generating circuit for generating luminance data at the position of said virtual pixel on the basis of the surrounding pixel data of colors, which include complementary colors; and

a luminance generating and interpolating circuit for interpolating luminance data at the position of said photosensitive cell surrounded by the luminance data, and

outputting plane luminance data.

25. The apparatus in accordance with claim 20, wherein said still picture data calculating circuit comprises:

a primary color generating circuit for simultaneously generating three primary color pixel data at the position of each virtual pixel;

a primary color generating and interpolating circuit for calculating and interpolating, by using the three primary color pixel data, the primary color data at the position of each photosensitive cell surrounded by said three primary color pixel data, and outputting plane pixel data color by color;

a luminance data generating circuit for generating luminance data at the position of said virtual pixel on the basis of the surrounding pixel data of colors, which include complementary colors; and

a luminance generating and interpolating circuit for interpolating luminance data at the position of said photosensitive cell surrounded by the luminance data, and outputting plane luminance data.

26. The apparatus in accordance with claim 21, wherein said still picture data calculating circuit comprises:

a primary color generating circuit for simultaneously generating three primary color pixel data at the position of each virtual pixel;

a primary color generating and interpolating circuit for calculating and interpolating, by using the three primary color pixel data, the primary color data at the position of each photosensitive cell surrounded by said three primary color pixel data, and outputting plane pixel data color by color;

a luminance data generating circuit for generating luminance data at the position of said virtual pixel on the basis of the surrounding pixel data of colors, which include

complementary colors; and

a luminance generating and interpolating circuit for interpolating luminance data at the position of said photosensitive cell surrounded by the luminance data, and outputting plane luminance data.

27. The apparatus in accordance with claim 22, wherein said still picture data calculating circuit comprises:

a primary color generating circuit for simultaneously generating three primary color pixel data at the position of each virtual pixel;

a primary color generating and interpolating circuit for calculating and interpolating, by using the three primary color pixel data, the primary color data at the position of each photosensitive cell surrounded by said three primary color pixel data, and outputting plane pixel data color by color;

a luminance data generating circuit for generating luminance data at the position of said virtual pixel on the basis of the surrounding pixel data of colors, which include complementary colors; and

a luminance generating and interpolating circuit for interpolating luminance data at the position of said photosensitive cell surrounded by the luminance data, and outputting plane luminance data.

28. The apparatus in accordance with claim 23, wherein said primary color generating and interpolating circuit comprises:

a red (R) plane interpolating circuit for generating R pixel data on the basis of pixel data around said R pixel data while taking account of a correlation between said R pixel data and said pixel data around said R pixel data;

a G plane interpolating circuit for generating G pixel data on the basis of pixel data around said G pixel data while

taking account of a correlation between said G pixel data and said pixel data around said G pixel data; and

a blue (B) plane interpolating circuit for generating B pixel data on the basis of pixel data around said B pixel data while taking account of a correlation between said B pixel data and said pixel data around said B pixel data.

29. The apparatus in accordance with claim 24, wherein said primary color generating and interpolating circuit comprises:

a red (R) plane interpolating circuit for generating R pixel data on the basis of pixel data around said R pixel data while taking account of a correlation between said R pixel data and said pixel data around said R pixel data;

a G plane interpolating circuit for generating G pixel data on the basis of pixel data around said G pixel data while taking account of a correlation between said G pixel data and said pixel data around said G pixel data; and

a blue (B) plane interpolating circuit for generating B pixel data on the basis of pixel data around said B pixel data while taking account of a correlation between said B pixel data and said pixel data around said B pixel data.

30. The apparatus in accordance with claim 25, wherein said primary color generating and interpolating circuit comprises:

a red (R) plane interpolating circuit for generating R pixel data on the basis of pixel data around said R pixel data while taking account of a correlation between said R pixel data and said pixel data around said R pixel data;

a G plane interpolating circuit for generating G pixel data on the basis of pixel data around said G pixel data while taking account of a correlation between said G pixel data and said pixel data around said G pixel data; and

a blue (B) plane interpolating circuit for generating B pixel data on the basis of pixel data around said B pixel data while taking account of a correlation between said B pixel data and said pixel data around said B pixel data.

31. The apparatus in accordance with claim 26, wherein said primary color generating and interpolating circuit comprises:

a red (R) plane interpolating circuit for generating R pixel data on the basis of pixel data around said R pixel data while taking account of a correlation between said R pixel data and said pixel data around said R pixel data;

a G plane interpolating circuit for generating G pixel data on the basis of pixel data around said G pixel data while taking account of a correlation between said G pixel data and said pixel data around said G pixel data; and

a blue (B) plane interpolating circuit for generating B pixel data on the basis of pixel data around said B pixel data while taking account of a correlation between said B pixel data and said pixel data around said B pixel data.

32. The apparatus in accordance with claim 27, wherein said primary color generating and interpolating circuit comprises:

a red (R) plane interpolating circuit for generating R pixel data on the basis of pixel data around said R pixel data while taking account of a correlation between said R pixel data and said pixel data around said R pixel data;

a G plane interpolating circuit for generating G pixel data on the basis of pixel data around said G pixel data while taking account of a correlation between said G pixel data and said pixel data around said G pixel data; and

a blue (B) plane interpolating circuit for generating B pixel data on the basis of pixel data around said B pixel

data while taking account of a correlation between said B pixel data and said pixel data around said B pixel data.

33. The apparatus in accordance with claim 23, wherein said luminance data generating circuit comprises a sum calculating circuit for calculating a sum of four-color pixel data of said photosensitive cells that surround the virtual pixel being observed.

34. The apparatus in accordance with claim 24, wherein said luminance data generating circuit comprises a sum calculating circuit for calculating a sum of four-color pixel data of said photosensitive cells that surround the virtual pixel being observed.

35. The apparatus in accordance with claim 25, wherein said luminance data generating circuit comprises a sum calculating circuit for calculating a sum of four-color pixel data of said photosensitive cells that surround the virtual pixel being observed.

36. The apparatus in accordance with claim 26, wherein said luminance data generating circuit comprises a sum calculating circuit for calculating a sum of four-color pixel data of said photosensitive cells that surround the virtual pixel being observed.

37. The apparatus in accordance with claim 27, wherein said luminance data generating circuit comprises a sum calculating circuit for calculating a sum of four-color pixel data of said photosensitive cells that surround the virtual pixel being observed.

38. The apparatus in accordance with claim 23, wherein

said luminance generating and interpolating circuit interpolates luminance data in the position of the photosensitive cell, which is being observed, by using luminance data around said photosensitive cell while taking account of a correlation between said luminance data.

39. The apparatus in accordance with claim 24, wherein said luminance generating and interpolating circuit interpolates luminance data in the position of the photosensitive cell, which is being observed, by using luminance data around said photosensitive cell while taking account of a correlation between said luminance data.

40. The apparatus in accordance with claim 25, wherein said luminance generating and interpolating circuit interpolates luminance data in the position of the photosensitive cell, which is being observed, by using luminance data around said photosensitive cell while taking account of a correlation between said luminance data.

41. The apparatus in accordance with claim 26, wherein said luminance generating and interpolating circuit interpolates luminance data in the position of the photosensitive cell, which is being observed, by using luminance data around said photosensitive cell while taking account of a correlation between said luminance data.

42. The apparatus in accordance with claim 27, wherein said luminance generating and interpolating circuit interpolates luminance data in the position of the photosensitive cell, which is being observed, by using luminance data around said photosensitive cell while taking account of a correlation between said luminance data.

43. The apparatus in accordance with claim 13, wherein said high frequency circuit comprises:

a high-pass filter circuit for passing high frequency components of the luminance data to thereby output high frequency luminance data; and

a first adding circuit for adding color-by-color plane pixel data fed from said primary color generating and interpolating circuit and the high frequency luminance data.

44. The apparatus in accordance with claim 14, wherein said high frequency circuit comprises:

a high-pass filter circuit for passing high frequency components of the luminance data to thereby output high frequency luminance data; and

a first adding circuit for adding color-by-color plane pixel data fed from said primary color generating and interpolating circuit and the high frequency luminance data.

45. The apparatus in accordance with claim 15, wherein said high frequency circuit comprises:

a high-pass filter circuit for passing high frequency components of the luminance data to thereby output high frequency luminance data; and

a first adding circuit for adding color-by-color plane pixel data fed from said primary color generating and interpolating circuit and the high frequency luminance data.

46. The apparatus in accordance with claim 16, wherein said high frequency circuit comprises:

a high-pass filter circuit for passing high frequency components of the luminance data to thereby output high frequency luminance data; and

a first adding circuit for adding color-by-color plane pixel data fed from said primary color generating and

interpolating circuit and the high frequency luminance data.

47. The apparatus in accordance with claim 17, wherein said high frequency circuit comprises:

a high-pass filter circuit for passing high frequency components of the luminance data to thereby output high frequency luminance data; and

a first adding circuit for adding color-by-color plane pixel data fed from said primary color generating and interpolating circuit and the high frequency luminance data.

48. The apparatus in accordance with claim 8, wherein said signal processing circuit comprises:

a correcting circuit for correcting pixel data fed from said photosensitive cells;

an interpolating circuit for generating, in the first mode, primary color pixel data at the positions of said virtual pixels or the positions of said photosensitive cells or calculating, in the second mode, primary color pixel data at the positions of said virtual pixels, calculating the primary color data at the positions of said photosensitive cells by using calculated primary color pixel data, generating luminance data at the positions of said virtual pixels, and calculating luminance data at the positions of said photosensitive cells by using calculated luminance data; and

a broadband circuit for interpolating data in said virtual pixels by using said photosensitive cells, generating pixel data at the positions of said photosensitive cells on the basis of said data, and broadening a frequency band of said data interpolated and said data generated;

said broadband circuit comprising:

a band-by-band data generating circuit for calculating, based on the pixel data output from said interpolating circuit and assigned to said virtual pixels, luminance data and

chrominance data relating to the pixel data assigned to said photosensitive cells in accordance with a frequency band;

a quasi-frequency adding circuit for adding, with respect to frequency, a component signal output from said band-by-band data generating circuit and giving priority to color reproducibility and a component signal also output from said band-by-band data generating circuit, but giving priority to resolution; and

an overlap preventing circuit for preventing, when said component signal giving priority to color reproducibility and said component signal giving priority to resolution contain a same frequency band, said same frequency band from overlapping.

49. The apparatus in accordance with claim 9, wherein said signal processing circuit comprises:

a correcting circuit for correcting pixel data fed from said photosensitive cells;

an interpolating circuit for generating, in the first mode, primary color pixel data at the positions of said virtual pixels or the positions of said photosensitive cells or calculating, in the second mode, primary color pixel data at the positions of said virtual pixels, calculating the primary color data at the positions of said photosensitive cells by using calculated primary color pixel data, generating luminance data at the positions of said virtual pixels, and calculating luminance data at the positions of said photosensitive cells by using calculated luminance data; and

a broadband circuit for interpolating data in said virtual pixels by using said photosensitive cells, generating pixel data at the positions of said photosensitive cells on the basis of said data, and broadening a frequency band of said data interpolated and said data generated;

said broadband circuit comprising:

a band-by-band data generating circuit for calculating, based on the pixel data output from said interpolating circuit and assigned to said virtual pixels, luminance data and chrominance data relating to the pixel data assigned to said photosensitive cells in accordance with a frequency band;

a quasi-frequency adding circuit for adding, with respect to frequency, a component signal output from said band-by-band data generating circuit and giving priority to color reproducibility and a component signal also output from said band-by-band data generating circuit, but giving priority to resolution; and

an overlap preventing circuit for preventing, when said component signal giving priority to color reproducibility and said component signal giving priority to resolution contain a same frequency band, said same frequency band from overlapping.

50. The apparatus in accordance with claim 10, wherein said signal processing circuit comprises:

a correcting circuit for correcting pixel data fed from said photosensitive cells;

an interpolating circuit for generating, in the first mode, primary color pixel data at the positions of said virtual pixels or the positions of said photosensitive cells or calculating, in the second mode, primary color pixel data at the positions of said virtual pixels, calculating the primary color data at the positions of said photosensitive cells by using calculated primary color pixel data, generating luminance data at the positions of said virtual pixels, and calculating luminance data at the positions of said photosensitive cells by using calculated luminance data; and

a broadband circuit for interpolating data in said virtual pixels by using said photosensitive cells, generating pixel data at the positions of said photosensitive cells on the basis

of said data, and broadening a frequency band of said data interpolated and said data generated;

said broadband circuit comprising:

a band-by-band data generating circuit for calculating, based on the pixel data output from said interpolating circuit and assigned to said virtual pixels, luminance data and chrominance data relating to the pixel data assigned to said photosensitive cells in accordance with a frequency band;

a quasi-frequency adding circuit for adding, with respect to frequency, a component signal output from said band-by-band data generating circuit and giving priority to color reproducibility and a component signal also output from said band-by-band data generating circuit, but giving priority to resolution; and

an overlap preventing circuit for preventing, when said component signal giving priority to color reproducibility and said component signal giving priority to resolution contain a same frequency band, said same frequency band from overlapping.

51. The apparatus in accordance with claim 11, wherein said signal processing circuit comprises:

a correcting circuit for correcting pixel data fed from said photosensitive cells;

an interpolating circuit for generating, in the first mode, primary color pixel data at the positions of said virtual pixels or the positions of said photosensitive cells or calculating, in the second mode, primary color pixel data at the positions of said virtual pixels, calculating the primary color data at the positions of said photosensitive cells by using calculated primary color pixel data, generating luminance data at the positions of said virtual pixels, and calculating luminance data at the positions of said photosensitive cells by using calculated luminance data; and

a broadband circuit for interpolating data in said virtual pixels by using said photosensitive cells, generating pixel data at the positions of said photosensitive cells on the basis of said data, and broadening a frequency band of said data interpolated and said data generated;

said broadband circuit comprising:

a band-by-band data generating circuit for calculating, based on the pixel data output from said interpolating circuit and assigned to said virtual pixels, luminance data and chrominance data relating to the pixel data assigned to said photosensitive cells in accordance with a frequency band;

a quasi-frequency adding circuit for adding, with respect to frequency, a component signal output from said band-by-band data generating circuit and giving priority to color reproducibility and a component signal also output from said band-by-band data generating circuit, but giving priority to resolution; and

an overlap preventing circuit for preventing, when said component signal giving priority to color reproducibility and said component signal giving priority to resolution contain a same frequency band, said same frequency band from overlapping.

52. The apparatus in accordance with claim 12, wherein said signal processing circuit comprises:

a correcting circuit for correcting pixel data fed from said photosensitive cells;

an interpolating circuit for generating, in the first mode, primary color pixel data at the positions of said virtual pixels or the positions of said photosensitive cells or calculating, in the second mode, primary color pixel data at the positions of said virtual pixels, calculating the primary color data at the positions of said photosensitive cells by using calculated primary color pixel data, generating luminance

data at the positions of said virtual pixels, and calculating luminance data at the positions of said photosensitive cells by using calculated luminance data; and

a broadband circuit for interpolating data in said virtual pixels by using said photosensitive cells, generating pixel data at the positions of said photosensitive cells on the basis of said data, and broadening a frequency band of said data interpolated and said data generated;

said broadband circuit comprising:

a band-by-band data generating circuit for calculating, based on the pixel data output from said interpolating circuit and assigned to said virtual pixels, luminance data and chrominance data relating to the pixel data assigned to said photosensitive cells in accordance with a frequency band;

a quasi-frequency adding circuit for adding, with respect to frequency, a component signal output from said band-by-band data generating circuit and giving priority to color reproducibility and a component signal also output from said band-by-band data generating circuit, but giving priority to resolution; and

an overlap preventing circuit for preventing, when said component signal giving priority to color reproducibility and said component signal giving priority to resolution contain a same frequency band, said same frequency band from overlapping.

53. The apparatus in accordance with claim 48, wherein said band-by-band data generating circuit comprises a high frequency, luminance data generating circuit for executing high-pass filtering with the pixel data input to said signal processing circuit either directly or after transforming said pixel data to primary color pixel data.

54. The apparatus in accordance with claim 49, wherein

said band-by-band data generating circuit comprises a high frequency, luminance data generating circuit for executing high-pass filtering with the pixel data input to said signal processing circuit either directly or after transforming said pixel data to primary color pixel data.

55. The apparatus in accordance with claim 50, wherein said band-by-band data generating circuit comprises a high frequency, luminance data generating circuit for executing high-pass filtering with the pixel data input to said signal processing circuit either directly or after transforming said pixel data to primary color pixel data.

56. The apparatus in accordance with claim 51, wherein said band-by-band data generating circuit comprises a high frequency, luminance data generating circuit for executing high-pass filtering with the pixel data input to said signal processing circuit either directly or after transforming said pixel data to primary color pixel data.

57. The apparatus in accordance with claim 52, wherein said band-by-band data generating circuit comprises a high frequency, luminance data generating circuit for executing high-pass filtering with the pixel data input to said signal processing circuit either directly or after transforming said pixel data to primary color pixel data.

58. The apparatus in accordance with claim 53, wherein said quasi-adding circuit comprises:

a second adding circuit for receiving a first component signal up to a frequency band, which gives priority to resolution, from said band-by-band data generating circuit via a subtraction terminal and receiving a second component signal lower in frequency band than said first component signal

and giving priority to color reproducibility via an addition terminal;

a second filter circuit for removing aliasing distortion from said an output of said second adding circuit and said first component signal; and

a third adding circuit for adding outputs of said second filtering circuit.

59. The apparatus in accordance with claim 54, wherein said quasi-adding circuit comprises:

a second adding circuit for receiving a first component signal up to a frequency band, which gives priority to resolution, from said band-by-band data generating circuit via a subtraction terminal and receiving a second component signal lower in frequency band than said first component signal and giving priority to color reproducibility via an addition terminal;

a second filter circuit for removing aliasing distortion from said an output of said second adding circuit and said first component signal; and

a third adding circuit for adding outputs of said second filtering circuit.

60. The apparatus in accordance with claim 55, wherein said quasi-adding circuit comprises:

a second adding circuit for receiving a first component signal up to a frequency band, which gives priority to resolution, from said band-by-band data generating circuit via a subtraction terminal and receiving a second component signal lower in frequency band than said first component signal and giving priority to color reproducibility via an addition terminal;

a second filter circuit for removing aliasing distortion from said an output of said second adding circuit and said first component signal; and

a third adding circuit for adding outputs of said second filtering circuit.

61. The apparatus in accordance with claim 56, wherein said quasi-adding circuit comprises:

a second adding circuit for receiving a first component signal up to a frequency band, which gives priority to resolution, from said band-by-band data generating circuit via a subtraction terminal and receiving a second component signal lower in frequency band than said first component signal and giving priority to color reproducibility via an addition terminal;

a second filter circuit for removing aliasing distortion from said an output of said second adding circuit and said first component signal; and

a third adding circuit for adding outputs of said second filtering circuit.

62. The apparatus in accordance with claim 57, wherein said quasi-adding circuit comprises:

a second adding circuit for receiving a first component signal up to a frequency band, which gives priority to resolution, from said band-by-band data generating circuit via a subtraction terminal and receiving a second component signal lower in frequency band than said first component signal and giving priority to color reproducibility via an addition terminal;

a second filter circuit for removing aliasing distortion from said an output of said second adding circuit and said first component signal; and

a third adding circuit for adding outputs of said second filtering circuit.

63. The apparatus in accordance with claim 58, wherein

said overlap preventing circuit comprises:

a third filter circuit for limiting a frequency band of one of signals output from said quasi-adding circuit identical with a frequency band of the other signal; and

an adding circuit for adding an output of said third filter circuit and the other signal containing a same frequency band as the one signal.

64. The apparatus in accordance with claim 59, wherein said overlap preventing circuit comprises:

a third filter circuit for limiting a frequency band of one of signals output from said quasi-adding circuit identical with a frequency band of the other signal; and

an adding circuit for adding an output of said third filter circuit and the other signal containing a same frequency band as the one signal.

65. The apparatus in accordance with claim 60, wherein said overlap preventing circuit comprises:

a third filter circuit for limiting a frequency band of one of signals output from said quasi-adding circuit identical with a frequency band of the other signal; and

an adding circuit for adding an output of said third filter circuit and the other signal containing a same frequency band as the one signal.

66. The apparatus in accordance with claim 61, wherein said overlap preventing circuit comprises:

a third filter circuit for limiting a frequency band of one of signals output from said quasi-adding circuit identical with a frequency band of the other signal; and

an adding circuit for adding an output of said third filter circuit and the other signal containing a same frequency band as the one signal.

67. The apparatus in accordance with claim 62, wherein said overlap preventing circuit comprises:

a third filter circuit for limiting a frequency band of one of signals output from said quasi-adding circuit identical with a frequency band of the other signal; and

an adding circuit for adding an output of said third filter circuit and the other signal containing a same frequency band as the one signal.

68. The apparatus in accordance with claim 63, wherein said primary color generating circuit comprises:

a difference calculating circuit for calculating a difference between, among pixel data of one field derived from signal charges read out of said image pickup section and mixed by two lines by interlace scanning and pixel data of the other field derived from signal charges read out of said image pickup section and mixed by two lines by interlace scanning, two lines of mixed pixel data belonging to different fields from each other, but spatially adjoining each other;

a sum producing circuit for producing a sum of the two lines of mixed pixel data;

a G generating circuit for subtracting the differences from the sum output from said sum producing circuit to thereby generate G pixel data; and

a RB generating circuit for adding one of the two differences and the G pixel data and adding the other of said two differences and said G pixel data to thereby generate R pixel data and B pixel data.

69. The apparatus in accordance with claim 64, wherein said primary color generating circuit comprises:

a difference calculating circuit for calculating a difference between, among pixel data of one field derived from signal charges read out of said image pickup section and mixed

by two lines by interlace scanning and pixel data of the other field derived from signal charges read out of said image pickup section and mixed by two lines by interlace scanning, two lines of mixed pixel data belonging to different fields from each other, but spatially adjoining each other;

a sum producing circuit for producing a sum of the two lines of mixed pixel data;

a G generating circuit for subtracting the differences from the sum output from said sum producing circuit to thereby generate G pixel data; and

a RB generating circuit for adding one of the two differences and the G pixel data and adding the other of said two differences and said G pixel data to thereby generate R pixel data and B pixel data.

70. The apparatus in accordance with claim 65, wherein said primary color generating circuit comprises:

a difference calculating circuit for calculating a difference between, among pixel data of one field derived from signal charges read out of said image pickup section and mixed by two lines by interlace scanning and pixel data of the other field derived from signal charges read out of said image pickup section and mixed by two lines by interlace scanning, two lines of mixed pixel data belonging to different fields from each other, but spatially adjoining each other;

a sum producing circuit for producing a sum of the two lines of mixed pixel data;

a G generating circuit for subtracting the differences from the sum output from said sum producing circuit to thereby generate G pixel data; and

a RB generating circuit for adding one of the two differences and the G pixel data and adding the other of said two differences and said G pixel data to thereby generate R pixel data and B pixel data.

71. The apparatus in accordance with claim 66, wherein said primary color generating circuit comprises:

a difference calculating circuit for calculating a difference between, among pixel data of one field derived from signal charges read out of said image pickup section and mixed by two lines by interlace scanning and pixel data of the other field derived from signal charges read out of said image pickup section and mixed by two lines by interlace scanning, two lines of mixed pixel data belonging to different fields from each other, but spatially adjoining each other;

a sum producing circuit for producing a sum of the two lines of mixed pixel data;

a G generating circuit for subtracting the differences from the sum output from said sum producing circuit to thereby generate G pixel data; and

a RB generating circuit for adding one of the two differences and the G pixel data and adding the other of said two differences and said G pixel data to thereby generate R pixel data and B pixel data.

72. The apparatus in accordance with claim 67, wherein said primary color generating circuit comprises:

a difference calculating circuit for calculating a difference between, among pixel data of one field derived from signal charges read out of said image pickup section and mixed by two lines by interlace scanning and pixel data of the other field derived from signal charges read out of said image pickup section and mixed by two lines by interlace scanning, two lines of mixed pixel data belonging to different fields from each other, but spatially adjoining each other;

a sum producing circuit for producing a sum of the two lines of mixed pixel data;

a G generating circuit for subtracting the differences from the sum output from said sum producing circuit to thereby

generate G pixel data; and

a RB generating circuit for adding one of the two differences and the G pixel data and adding the other of said two differences and said G pixel data to thereby generate R pixel data and B pixel data.

73. A signal processing method applicable to a solid image pickup apparatus including photosensitive cells arranged bidimensionally while being shifted from adjoining ones in a horizontal and a vertical direction with respect to a pixel and color filter segments, which include complementary colors, arranged bidimensionally, for reading out signal charges generated by said photosensitive cells in response to light incident via said color filter segments, converting said signal charges to pixel signals, and processing said pixel signals, said method comprising:

a mode selecting step of selecting, when reading the signal charges out of the photosensitive cells, either one of a first mode in which said signal charges are read out of a plurality of lines and mixed to thereby produce the pixel signals and a second mode in which all of said signal charges are sequentially read out to thereby produce the pixel signals;

a shooting step of outputting image signals representative of a scene picked up in accordance with drive signals in the first mode or the second mode selected;

a digitizing step of digitizing the image signal to corresponding digital data;

a data storing step of storing the digital data as pixel data;

a primary color generating step of reading out the pixel data stored, correcting said pixel data, and executing particular processing with said pixel data corrected in accordance with each of the first and second modes; and

a signal processing step of generating, based on resulting

three primary color pixel data, luminance data and chrominance data and processing said luminance data and said chrominance data for enhancing quality;

said primary color generating step comprising:

a first primary color generating step of interlace-scanning, in the first mode, the signal charges derived from the color filter segments, which include the complementary colors, to thereby read out the signal charges belonging to a same field, mixing said signal charges, and generating the primary color pixel data on the basis of resulting mixed pixel data; and

a second primary color generating step of sequentially reading out, in the second mode, the signal charges derived from the color filter segments, which include the complementary colors, to thereby generate primary color pixel data on the basis of a plurality of pixel data read out, generating the primary color image data greater in number than the photosensitive cells, and raising a frequency band of said primary color pixel data.

74. The method in accordance with claim 73, wherein said first primary color generating step comprises:

a difference calculating step of calculating two differences between, among two lines of mixed pixel data each belonging to a particular field, between the mixed pixel data each belonging to a particular field, but spatially adjoining each other;

a sum calculating step of adding, among the two lines of mixed pixel data, the pixel data each belonging to a particular field, but spatially adjoining each other to thereby produce a sum of all colors;

a G calculating step of subtracting the two differences from the sum and dividing resulting differences by a preselected constant to thereby generate G pixel data;

an R calculating step of adding one of the two differences and the G pixel data and dividing a resulting sum by a preselected constant to thereby generate R pixel data; and

a B calculating step of adding the other of the two differences and the G pixel data and dividing a resulting sum by a preselected constant to thereby generate B pixel data.

75. The method in accordance with claim 74, wherein said second primary color generating step comprises:

a virtual pixel generating step of generating, assuming that void positions where the photosensitive cells are absent due to a shifted arrangement of said photosensitive cells are virtual pixels, three primary color data at a position of each virtual pixel surrounded by the pixel data, which are sequentially read out, on the basis of said pixel data sequentially read out by using a matrix;

an actual pixel generating step of generating, based on the three primary color pixel data generated at positions of the virtual pixels, the three primary color pixel data at positions of actual pixels defined by the photosensitive cells;

a luminance data generating step of producing a sum of a plurality of pixel data around each virtual pixel to thereby generate luminance data for said virtual pixel;

a luminance interpolating step of generating luminance data at a position of each photosensitive cell on the basis of a plurality of luminance data around said photosensitive cell; and

a frequency raising step of adding to each primary color pixel data a high frequency component of a corresponding one of the luminance data to thereby raise a frequency band.

76. The method in accordance with claim 74, wherein said primary color generating step executes at least one of said first and second primary color generating steps with the pixel

data by derived from a color filter in which a plurality of colors selected from Cy, Mg, Ye, W and G derived from subtractive mixture are used, a first tetragonal lattice is implemented by four of said colors and contains a first color positioned at one pair of diagonally opposite corners, a second color positioned at the other pair of diagonally opposite corners, and a third color positioned at a center, wherein a second tetragonal lattice, which is shifted from said first tetragonal lattice by one-half of the pixel pitch in the horizontal and vertical directions, contains a same color positioned at one pair of diagonally opposite corners and a fourth color positioned at the other pair of diagonally opposite corners in a checker pattern, and wherein said first and second tetragonal lattices partly overlap each other.

77. The method in accordance with claim 75, wherein said frequency raising step comprises:

a first filtering step of passing only high frequency components of the luminance data and the luminance generated by interpolation; and

a second adding step of adding the luminance data of the high frequency components respectively assigned to the positions of the three primary color data.

78. The method in accordance with claim 75, wherein said luminance data generating step directly uses the pixel data resulting from a shot as the luminance data at the positions of the photosensitive cells, and wherein said luminance interpolating step interpolates the luminance data in the position of each virtual pixel by low-pass filtering, by using a mean of four pixel data around said virtual pixel, or by using a horizontal, a vertical or an oblique correlation between the pixel data around said virtual pixel.

79. The method in accordance with claim 73, wherein said second primary color generating step comprises:

a virtual pixel generating step of generating, assuming that void positions where the photosensitive cells are absent due to a shifted arrangement of said photosensitive cells are virtual pixels, three primary color data at a position of each virtual pixel surrounded by the pixel data, which are sequentially read out, on the basis of said pixel data sequentially read out by using a matrix;

an actual pixel generating step of generating, based on the three primary color pixel data generated at positions of the virtual pixels, the three primary color pixel data at positions of actual pixels defined by the photosensitive cells;

a luminance data generating step of producing a sum of a plurality of pixel data around each virtual pixel to thereby generate luminance data for said virtual pixel;

a luminance interpolating step of generating luminance data at a position of each photosensitive cell on the basis of a plurality of luminance data around said photosensitive cell; and

a frequency raising step of adding to each primary color pixel data a high frequency component of a corresponding one of the luminance data to thereby raise a frequency band; and

wherein said frequency raising step comprises:

an item-by-item data generating step of generating, based on the three primary color pixel data and the luminance data, component signals respectively giving priority to accurate color reproducibility and resolution in at least one of the horizontal and vertical directions;

a quasi-frequency adding step of adding the component signals respectively giving priority to accurate color reproducibility and resolution with respect to frequency;

an overlap preventing step of preventing, when the component signals giving priority to resolution in the vertical

and horizontal directions contain a same frequency band, said same frequency band from overlapping; and

an adjusting step of adjusting the luminance data output via said overlap preventing step or plane luminance data to thereby enhance a contour.

80. The method in accordance with claim 73, wherein said second primary color generating step comprises:

a virtual pixel generating step of generating, assuming that void positions where the photosensitive cells are absent due to a shifted arrangement of said photosensitive cells are virtual pixels, three primary color data at a position of each virtual pixel surrounded by the pixel data, which are sequentially read out, on the basis of said pixel data sequentially read out by using a matrix; and

an actual pixel generating step of generating, based on the three primary color pixel data generated at positions of the virtual pixels, the three primary color pixel data at positions of actual pixels defined by the photosensitive cells; and

wherein a frequency raising step of adding to each primary color pixel data a high frequency component of a corresponding one of the luminance data to thereby raise a frequency band; and

wherein said frequency raising step comprises:

an item-by-item data generating step of generating, based on the three primary color pixel data and the luminance data, component signals respectively giving priority to accurate color reproducibility and resolution in at least one of the horizontal and vertical directions;

a quasi-frequency adding step of adding the component signals respectively giving priority to accurate color reproducibility and resolution with respect to frequency;

an overlap preventing step of preventing, when the

component signals giving priority to resolution in the vertical and horizontal directions contain a same frequency band, said same frequency band from overlapping; and

an adjusting step of adjusting the luminance data output via said overlap preventing step or plane luminance data to thereby enhance a contour.

81. The method in accordance with claim 80, wherein said item-by-item data generating step generates high frequency luminance data on the basis of the pixel data and outputs said high frequency luminance data as the component signals giving priority to resolution.

82. The method in accordance with claim 80, wherein said quasi-frequency adding step comprises:

a subtracting step of subtracting from first component signals generated in said pixel data generating step and lying in a frequency band giving priority to resolution second component signals that are lower in frequency than said first component signals and give priority to color reproducibility;

a distortion preventing step of removing aliasing distortion from signals output in said subtracting step and the first component signals; and

a second adding step of adding signals output in said distortion preventing step.

83. The method in accordance with claim 82, wherein said overlap preventing step comprises:

a band limiting step of limiting a frequency band of one of the component signals in the vertical and horizontal directions identical with a frequency band of the other component signal; and

an adding step of adding a band-limited output of said band limiting step and the other component signal containing

a same said frequency band as the one component signal.